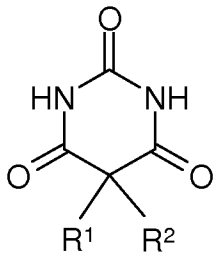
Listing of Claims:

1. (Currently amended) An *in vivo* imaging agent of Formula I:

$$[\{\text{inhibitor}\}\text{-}(A)_n]\text{-}[\text{imaging moiety}] \qquad (I)$$

where:

{inhibitor} is a synthetic barbituric acid matrix metalloproteinase inhibitor, of Formula IV, which is labeled at the R^2 substituent ~~5-position of the barbituric acid~~ with said imaging moiety;



(IV)

wherein:

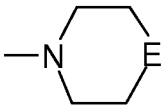
R^1 is R" or a Z group;

R^2 is R", Y or $-NR^4R^5$, where R^4 is H or an R" group, R^5 is H, C_{2-14} acyl, C_{2-10} aminoalkyl or (N-C_{2-14} acyl)C_{2-10} aminoalkyl or an R" group, or R^4 and R^5 together with the N atom to which they are attached form an optionally (N-C_{2-14})acylated C_{2-8} cycloaminoalkylene ring;

R" is independently C_{1-14} alkyl, C_{3-8} cycloalkyl, C_{2-14} alkenyl, C_{1-14} fluoroalkyl, C_{1-14} perfluoroalkyl, C_{6-14} aryl, C_{2-14} heteroaryl or C_{7-16} alkylaryl;

Z is a group of formula $-A^1O[A^2O]_pR^3$ where p is 0 or 1, and A^1 and A^2 are independently C_{1-10} alkylene, C_{3-8} cycloalkylene, C_{1-10} perfluoroalkylene, C_{6-10} arylene or C_{2-10} heteroarylene, and R^3 is an R group where R is independently chosen from H, C_{1-4} alkyl, C_{2-4} alkenyl, C_{2-4} alkynyl, C_{1-4} alkoxyalkyl or C_{1-4} hydroxyalkyl;

Y is a group of formula:



where E is CR_2, O, S or NR^6; and R^6 is C_{2-14} acyl, or an R" or Z group;

$-(A)_n-$ is a linker group wherein each A is independently $-CR_2-$, -CR=CR- , -C≡C- , $-CR_2CO_2-$, $-CO_2CR_2-$, -NRCO- , -CONR- , -NR(C=O)NR-, -NR(C=S)NR-, $-SO_2NR-$, $-NRSO_2-$, $-CR_2OCR_2-$, $-CR_2SCR_2-$, $-CR_2NRCR_2-$, a C_{4-8} cycloheteroalkylene group, a C_{4-8} cycloalkylene group, a C_{5-12} arylene group, or a C_{3-12} heteroarylene group, an amino acid or a monodisperse polyethyleneglycol (PEG) building block;

R is independently chosen from H, C_{1-4} alkyl, C_{2-4} alkenyl, C_{2-4} alkynyl, C_{1-4} alkoxyalkyl or C_{1-4} hydroxyalkyl;

n is an integer of value 0 to 10;

wherein the imaging moiety can be detected externally in a non-invasive manner following administration of said labelled synthetic barbituric acid matrix metalloproteinase inhibitor to the mammalian body *in vivo*, and said imaging moiety is chosen from:

(i) a radioactive metal ion, which is a gamma emitter or a positron emitter and is chosen from ^{99m}Tc, ^{111}In, ^{64}Cu, ^{67}Cu, ^{67}Ga or ^{68}Ga;

(ii) the gamma-emitting radioactive halogen ^{123}I;

(iii) a positron-emitting radioactive non-metal chosen from ^{18}F, ^{11}C or ^{13}N.

2. (Cancelled)

3. (Previously presented) The imaging agent of Claim 1, where the synthetic barbituric acid matrix metalloproteinase inhibitor is conjugated to a ligand, and said ligand forms a metal complex with the radioactive metal ion.

4. (Original) The imaging agent of Claim 3, where the ligand is a chelating agent.

5. (Cancelled)

6. (Cancelled)

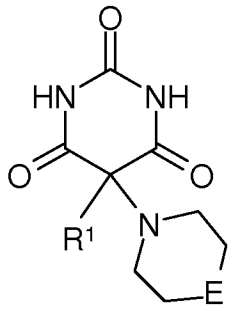
7. (Cancelled)

8. (Cancelled)

10. (Currently amended) The imaging agent of claim 1~~9~~, where R^2 is Y or $-NR^4R^5$.

11. (Cancelled)

12. (Currently amended) The imaging agent of claim 1~~9~~, of Formula V:



(V)

where E is CHR or NR^6 and R^1 is $C_{6\text{-}14}$ *n*-alkyl, or $C_{6\text{-}14}$ aryl.

13. (Currently amended) The imaging agent of claim 12, where E is NR^6 and R^6 is $C_{2\text{-}14}$ acyl; $-(CH_2)_dOH$, where d is 2, 3, 4 or 5; or $-C_6H_4X$, where X is H, $C_{1\text{-}4}$ alkyl, Hal, OR, NR_2, NO_2 or $SO_2NR^7R^8$, where R^7 and R^8 are independently R groups, and R is as defined in Claim 1~~9~~.

14. (Previously presented) The imaging agent of claim 12, where R^1 is *n*-octyl, *n*-decyl, biphenyl, C_6H_5X or $-C_6H_4-O-C_6H_4X$ where X is as defined in Claim 13.

15. (Cancelled)

16. (Cancelled)

17. (Currently Amended) The radiopharmaceutical composition of claim 1 ~~16~~, where the imaging moiety comprises a radioactive metal ion.

18. (Original) The radiopharmaceutical composition of claim 16, where the imaging moiety comprises a positron-emitting radioactive non-metal or a gamma-emitting radioactive halogen.

19. (Withdrawn) A conjugate of a synthetic barbituric acid matrix metalloproteinase inhibitor with a ligand, wherein the barbituric acid comprises a 5-position substituent, and said 5-position substituent comprises a ligand capable of forming a metal complex with a radioactive metal ion which is resistant to transchelation.

20. (Withdrawn) The conjugate of Claim 19, of Formula Ib:

$$[\{\text{inhibitor}\}\text{-}(A)_n]_m\text{-}[\text{ligand}] \quad \text{(Ib)},$$

where {inhibitor}, A, n and m are as defined in Claim 2.

21. (Withdrawn) The conjugate of Claim 19, wherein the synthetic barbituric acid matrix metalloproteinase inhibitor is of Formula IV or Formula V of Claims 9 to 14.

22. (Withdrawn) The conjugate of Claim 19, wherein the ligand is a chelating agent.

23. (Withdrawn) The conjugate of Claim 22, wherein the chelating agent has a diaminedioxime, N_2S_2, or N_3S donor set.

24. (Withdrawn) A kit for the preparation of the radiopharmaceutical composition of Claim 17, which comprises a conjugate of a synthetic barbituric acid matrix metalloproteinase inhibitor with a ligand, wherein the barbituric acid comprises a 5-position substituent, and said 5-position substituent comprises a ligand capable of forming a metal complex with a radioactive metal ion which is resistant to transchelation, said conjugate being of Formula Ib:

$$[\{\text{inhibitor}\}\text{-}(A)_n]_m\text{-}[\text{ligand}] \quad \text{(Ib)},$$

where {inhibitor}, A, n and m are as defined in Claim 2, and wherein the ligand is a chelating agent.

25. (Withdrawn) The kit of Claim 26, where the radioactive metal ion is ^{99m}Tc, and the kit further comprises a biocompatible reductant.

26. (Withdrawn) A kit for the preparation of the radiopharmaceutical composition of Claim 18, which comprises a precursor in sterile form which is a non-radioactive derivative of the barbituric acid matrix metalloproteinase inhibitor of claims 1, wherein said non-radioactive derivative is capable of reaction with a source of the positron-emitting radioactive non-metal or gamma-emitting radioactive halogen to give the desired radiopharmaceutical.

27. (Original) The kit of Claim 26, where the source of the positron-emitting radioactive non-metal or gamma-emitting radioactive halogen is chosen from:
    (i) halide ion;
    (ii) F^+ or I^+; or
    (iii) an alkylating agent chosen from an alkyl or fluoroalkyl halide, tosylate, triflate or mesylate;
    (iv) $HS(CH_2)_3{}^{18}F$.

28. (Previously presented) The kit of claim 26, wherein the non-radioactive derivative is chosen from:
    (i) an organometallic derivative such as a trialkylstannane or a trialkylsilane;

(ii) a derivative containing an alkyl or aryl iodide or bromide, alkyl tosylate or alkyl mesylate for nucleophilic substitution;

(iii) a derivative containing an aromatic ring activated towards nucleophilic or electrophilic substitution;

(iv) a derivative containing a functional group which undergoes facile alkylation;

(v) a derivative which undergoes alkylation with an alkyl thiol to give a thioether.

29. (Previously presented) The kit of claim 26, where the precursor is bound to a solid phase.

30. (Withdrawn) Use of the imaging agent of Claim 1 for the diagnostic imaging of atherosclerosis.

31. (Withdrawn) Use of the imaging agent of Claim 1 for the diagnostic imaging of unstable plaques.

32. (Withdrawn) Use of the imaging agent of Claim 1 for the intravascular detection of atherosclerosis.